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THE GREAT SCHOOL OF ETON.

ALL of our readers have heard of the great school of Eton, in England; but few know its history, organization, and plan of instruction. For the purpose of rendering all these clear, and allowing each to contrast it with our minor colleges, to which it bears some resemblance, we have abridged an account of it from the report of the Royal Commissioners on Public Schools.

Eton School is a school attached to a collegiate foundation, the legal title of which is "The College of the Blessed Mary of Eton, near Windsor." As originally constituted in 1441, the college was designed to consist of a provost, 70 scholars, 10 fellows, 10 chaplains, 10 clerks, 16 choristers, one head master, one lower master or usher, and 13 bedesmen. The college now consists of a provost, seven fellows, 70 scholars, a head and a lower master, three conducts or hired chaplains, 10 lay clerks, and 12 choristers, besides 10 servants—the place of the bedesmen being occupied by 10 almswomen.

Although strictly subordinate to the college, the school has so greatly outgrown the original foundation that it must now be regarded as a distinct institution. The distinction is, however, only roughly practicable, the two branches of the foundation being necessarily entwined with each other. Of the masters of the school two only (the head and lower master), and of the scholars seventy only (called "Collegers" or "King's Scholars"), are members of the college—the other scholars, constituting the great bulk of the school, living out of the college, and hence called "Oppidans"

or "Town Boys." These altogether make up between eight and nine hundred boys.

That the founder of Eton, like the founders of Winchester and Westminster, desired and intended that the benefits of his grammar-school should not be confined to a single class, is sufficiently clear from the statutes. The statutes of Eton College contemplate distinctly three classes of scholars:

1. Foundation boys (King's Scholars), lodged, fed, and, in part at least, clothed by the founder's bounty.

2. Boys lodged and fed by the college with the foundationers, but at a charge sufficient to cover the expenses of their maintenance.

3. Boys resorting to the school for instruction, but not boarded within the college (Oppidans).

That boys of the second class, styled in the statutes "Commensales," sons of noblemen and gentlemen, answering exactly to the Pensionarii at Westminster, and to the commoners and pensioners at the colleges of Oxford and Cambridge, did formerly exist at Eton, there is no doubt. The first Cavendish Earl of Devonshire, then a boy of nine, with his elder brother and a servant, was admitted on these terms in the year 1550. Between 1564 and 1648 the old audit books of the college contain the names of "Commensales" who dined in hall during that period, varying in number from thirty-seven downwards. They have entirely disappeared since the Restoration.

The original number of "King's Scholars" does not appear to have been at any

time increased, and the Oppidans have thus for centuries constituted the great bulk of the school.

The division of the school into upper and lower does not appear to have been created by the statutes, but to have arisen from the necessity of providing some preparatory instruction for the younger pupils who were unqualified to enter upon the regular studies of the school. The lower master—the *ostiarus* or usher of the original foundation—is now the head master of the lower school, subject to the control of the provost. The subjects taught are elementary classics, history, geography, arithmetic, writing, and dictation. Hardly any age is considered too early, nor any age under fourteen too late, for admission into the lower school. The general rule appears to be that boys may enter as soon as they are able to read, and they remain in it until they are fit for the upper school.

The old series of six ascending forms, consecrated by usage in most of the great schools of England and Germany, still subsists at Eton; but not for the purpose for which it was originally established—that of instruction in school. For that purpose, a “form” must of course be of manageable size, and composed of boys nearly equal in proficiency. The lowest three forms at Eton belong to the “lower school,” while the other three belong to the upper school, and after undergoing a gradual process of division and subdivision, now stand as follows:

Fourth	{	Lower remove.	{	Lower remove.
		Middle remove.		Upper remove.
		Upper remove.		Lower remove.
		Lower remove.		Upper remove.
Fifth	{	Lower Division	{	Lower remove.
		Middle Division		Upper remove.
		Upper Division.		Lower remove.
				Upper remove.
Sixth.				

There are thus, in fact, eleven forms or subdivisions of forms in the upper school, and a boy who advances regularly from the bottom makes ten steps to reach the top, each step marking, in theory at least, a grade of proficiency. The form and remove in which a boy is, denote his stage of advancement and his rank in the school;

but the forms first, and then the removes, have gradually grown too large to be handled by a single master; and it has been thought better, for the purpose of teaching in school, to distribute the whole mass afresh, without disturbing the organization already described, into groups of manageable size called “divisions,” each of which has a master of its own. The number of divisions may be multiplied or diminished from time to time, without affecting the number or arrangement of the removes, of which it is wholly independent; thus boys in different divisions may be in the same remove, and *vice versa*, and a boy may possibly be promoted into a higher remove without quitting his division or changing his class-master. The division, therefore, in which a boy is, marks the master by whom he is taught, and the group of boys with whom he goes into school, for the time being. Sometimes, too, a boy passes over a whole division without entering it.

Before admission to the upper school, a boy has to pass an examination, consisting of some easy translations from English into Latin, prose and verse, and from Greek and Latin into English. The standard is low; and nobody would believe, says Mr. Balston, how poor are the results obtained. If the candidate cannot come up even to this low standard, as is often the case, he is permitted to enter the lower school, which, as already stated, admits any boy who is able to read. There is no inferior limit of age; no boy is admitted after fourteen, except on special grounds; and no boy can be placed, on entrance, higher than in the lower part of the remove, or seven steps from the top of the school. The average age of entrance is from twelve to fourteen, and the average time of remaining at school four or five years.

The general government of the whole school, upper and lower, is vested in the head master, subject to the control of the provost. The discipline and classical instruction of the upper school were, in 1861, shared by the head master, with seventeen assistants; the lower master, with four assistants, having the like charge of the lower school.

The head master is, by the statutes, to be a Master of Arts, "if such can be procured conveniently," sufficiently instructed in grammar, and experienced in teaching, unmarried, and not holding ecclesiastical preferment within seven miles of Eton. He is not required to be a clergyman, nor to have been educated at Eton; but, practically, he is always both the one and the other. In his case, as in that of the fellows, the condition of celibacy has become obsolete. He is elected, and may be deprived by the provost and fellows.

Although the head master governs the school, he governs it under the control of the provost. This control is not, like the power of the governors in most other great schools, an almost nominal check; it is active, extensive, and minute. No assistant master can be appointed, no holiday or half-holiday given, no alteration of the school-hours made, no new school-book, or new edition of a school-book, introduced by the head master without the provost's sanction. This control applies not only to matters of real importance: "it has always been exercised even in the smallest matters."

This relation between the provost and head master springs historically from the old position of the latter as a subordinate officer of the college—"conductitius et re-motivus"—and subject to the control of its head. His statutory position is still the same as it was when the school contained only the seventy foundation boys, with such few "Commensales" and day scholars as could be taught with them by a master and usher. And whilst the number of the Oppidans has gradually increased, the provost has been constantly resident on the spot; and both provost and fellows have been men who, having spent much of their own lives as masters in the school, were naturally disposed to claim and exert a control over the working of it, and to receive, perhaps, with more or less of reluctance, alterations suggested by their successors which had not been deemed necessary by themselves.

The course of study at Eton was, until 1851, exclusively classical; it now embraces both classics and mathematics. There is a teacher of French attached to

the school, who resides at Eton; there is also a teacher of German, and one of Italian, who do not reside there, and lectures on Natural Science are delivered occasionally to such boys as choose to attend. In these subjects and in drawing some instruction may be obtained by boys who are willing to give up a part of their play-hours for the purpose, and whose parents are willing to pay for them as extras. But they do not enter into the course of study, and many boys often leave Eton without having learnt there any one of them.

The teaching of the classics at Eton divides itself into two branches—teaching in school, and teaching out of school or in pupil-room; and the large proportion which the latter bears to the former constitutes the chief peculiarity of the Eton system. The teaching out of school again consists, partly in the preparation of lessons which are to be construed in school, and the correction of exercises which are to be shown up in school; partly in private reading, the choice and direction of which rests wholly with the individual teacher, and which is quite independent of the school-work. Every assistant master has a share in this double teaching—in school, as a master in charge of a division—out of school, as a tutor; and every boy stands in a double relation to his tutor and to the master of his division, so that, except during the short time which he passes in the school-division of which his tutor has the charge, he is under a double system of instruction at almost every point in his school life. The head master takes a division, but does not act as a tutor.

The work in school consists in construing and in repeating passages learnt by heart from Latin and Greek poets. Including the time spent in showing up compositions previously corrected by the tutor, a boy is in school on an average not more than about two hours and a-half on a whole school-day; a lesson usually takes from thirty-five to fifty minutes. The real work is done out of school in "pupil-room," under the tutor, who not only goes over the pupils' exercises and construing before they go up to the division master, but goes through a large amount of private reading on any subject on which he may

find the boys deficient besides. Thus to a course of reading in school, which is narrow and incomplete, is superadded another course which the tutor may make as elastic and discursive as he pleases, it being left entirely to him to supply the amount and kind of instruction which the character and capacity of every individual boy may render desirable. The large amount of repetition and of Latin verse composition, and the sameness and narrow range of the reading in form, are among the chief peculiarities of Eton school-work; to which may be added, also, the large use of extract-books instead of original authors.

Fifty years ago, the boys at Eton were taught, or supposed to be taught, in large masses, and the curriculum through which they were conducted was much narrower than at present. The whole of the sixth form, with the upper fifth—198 in all—were, under Dr. Keate, heard together. The number of masters in the upper school was, in 1812, only six, and the average number in each form 80. The average number in a division does not at present exceed 40; the largest is 48; the smallest (the head master's) 32. There is a greater infusion of Attic authors than formerly in the higher divisions; but Homer, Virgil, and Horace continue to be the staple of the teaching in school.

A boy reads no Greek dramatic poetry in school till he reaches the very top of the fifth form; he may, and probably does, in all cases, read some in pupil-room, but this depends on the taste or judgment of his tutor. The Greek historians and Livy he reads only in extract-books.

The quantity of Latin and Greek poetry learnt by heart is very large. Speaking generally, every lesson which is construed is also learnt by heart. A boy has to say eighty lines of Homer and sixty lines of some other author alternately five days in the week. But the manner in which it is heard by no means ensures its being learnt by all the class; and the quantity exacted, it is stated, "has very often the effect of making the exercises of memory mechanical and slovenly, and therefore worse than useless." A Latin theme is done every week in the fifth form and remove; translations into Latin prose very rarely. There

is little or no Greek prose, and no English writing, prose or poetry, except two essays in a year for the sixth form.

In the judgment of the present provost and head master, the divisions are now reduced to a convenient size. And it appears to be the general, though not the universal, opinion of the assistants, that forty is a perfectly manageable number, and is indeed to be preferred to a smaller, as more easy to keep alive and better calculated to quicken the interest and call out the powers of the teacher. That it requires some skill in handling appears to be admitted, and that there is some difficulty in making the process of "calling up," and the dread of being called up, a thoroughly effective stimulus, each lesson lasting only about three-quarters of an hour; and this is a difficulty to which some of the younger masters do not appear to be insensible.

In the divisions of the fourth form and remove, places are taken during the lessons; but not higher, unless the master of a particular division should think fit to adopt this course.

Every classical master is paid, as such, forty-two guineas a-year (\$213.20, American gold), by the head master, and this petty payment is supposed to remunerate his work in school. As tutor, he receives £10.10s. from each pupil. If he has a boarding-house, he receives £120 from each boy in it, the payment for board being blended in one sum with that for tuition. The King's Scholars are distributed among the tutors by private arrangement.

The subject next in importance to classics in the school course is mathematics. Before the year 1836, there appears to have been no mathematical teachers of any kind at Eton. There was a titular teacher of writing, arithmetic, and mathematics; but he appears not to have taught, or been competent to teach, any thing but writing and arithmetic. In 1851, mathematics were, for the first time, incorporated into the regular work of the school; and Mr. Hawtrey was made mathematical assistant master, which placed him on the same level as the classical assistants. His own assistants, however, did not share in this elevation; they became or remained only

"assistants in the mathematical school," which position they still occupy. The distinction is by no means a merely nominal one; they have no share, as every classical assistant master has, in the right and duty of maintaining discipline out of school; they cannot act as "tutors," and they are excluded from all but the inferior boarding-houses, and are only allowed then to charge at the same rate as the "dames."

The time given to mathematical teaching at Eton is three hours a week throughout the school, besides an exercise (called by the boys "extra work") between each lesson. In the "trials" or examinations for removes, the highest marks in mathematics are allowed one-fifth of the value assigned to the highest marks in classics. A boy's advance in the mathematical school is regulated on the whole, though not exactly regulated, by his advance in the classical school; and thus a good mathematician may be kept during most of his time at school in mathematical classes much inferior to him, unless he happens also to be a good classic. A boy in the fourth classical division may be ranked in the mathematical school above all the boys in the third; but he must remain behind all those in the second, though they may be worse mathematicians than he.

The mathematical reading of an average boy extends to the first part of Colenso's *Algebra*, and four books of *Euclid*. A "fair number" read *trigonometry*; a few advance to conic sections, and fewer to analytical geometry, which is the highest point. The differential calculus has never hitherto been reached by any boy in the school. *Euclid* and *algebra* are begun in the fifth form, and the rule is that a boy does not get into the fifth "until he has a fair knowledge of arithmetic, including the rule of three and its application, fractions, and decimals."

History and geography, ancient and modern, are taught only in the division below the fifth form. Each master in the fourth form and remove chooses for his division what book and what portion of history he thinks fit, and afterwards reports what he has set to the head master. The elements of modern history are regularly taught in the lower school. In the lower

part of the upper school the subject is changed from modern history to ancient; and although lessons are set commonly in the fourth form, and more rarely in the remove, yet so soon as these forms are past, all direct instruction ceases, and boys are left to the inducements supplied by examinations and the opportunities given by holiday tasks to continue and extend their reading. In the two highest divisions of the school essays are occasionally set on historical subjects.

Teachers are provided for modern languages (French, German, and Italian). but, as already stated, the study of these is entirely optional. The French class had, in July, 1862, 75 attendants (the number has been as high as 130), the German class 25, and the Italian 3.

Physical science is not systematically taught, but lectures are delivered once a week during the two winter school-terms, by men of eminence, on scientific subjects. At the end of each lecture questions are proposed for the best written answers, to which a prize is awarded; and at the end of the course, questions are again proposed to be answered from recollection. Drawing is regularly taught by the visiting master, and a room fitted up with models and examples is open for four hours a day to those who wish to join the class. The instruction given is in artistic, not elementary drawing. Practical geometry and military plan drawing are taught in the mathematical school.

Music is not taught in the school. Those who desire it are at liberty to take private lessons; and two of the tutors have private musical classes.

The system of promotion from class to class is peculiar. "Removes," as they are called, take place twice a year, in June and December. At each remove each subdivision of every form in school, except the sixth and the upper division of the Fifth, is promoted in a body, and take rank as the subdivision next above it. Thus the boys in the lower remove of the fourth pass in a body into the middle remove, and the following half year they pass in the same way into the upper remove. The half-yearly removes within each form take place without examination; but before the

removes from form to form, examinations called "trials," of a very easy kind, are held, by which the fitness of each boy to pass into the form above is tested, and the places of the boys within the form are also determined. A boy who fails to pass the "trials" (a very unusual occurrence), remains in the form in which he is, and thus sinks into the remove below his own. On the other hand, a clever boy is sometimes allowed, on the recommendation of his tutor, to offer himself for a double remove. Thus, taking the divisions as A, B, C, D, a boy in A may either take the examination of his own division and pass into B, or he may take the examination of B instead, and if he succeeds in beating two-thirds of the boys in it, he will be at once promoted into C, without passing through B at all. As a general rule, however, a boy remains during the whole of his stay at Eton in the remove in which he is first placed. The system of removes ends with the upper division of the fifth, from which point promotion into the sixth takes place by seniority only.

The seventy "King's Scholars" or "Collegers" are elected by the provost, vice-provost, and head master of Eton, and the provost and two fellows of King's College,

Cambridge, after a competitive examination which is open to all boys from any part of England. Although, generally speaking, of a somewhat lower social grade than the Oppidans, the King's Scholars constitute intellectually the *élite* of the school, and it is by them chiefly that the reputation of Eton at the universities has been and continues to be sustained. They are exclusively eligible to scholarships at King's College, Cambridge, of which there are four open annually—the successful candidates being chosen by competitive examination. The maintenance and instruction of a King's Scholar is not wholly gratuitous. He pays fees to his tutor, notwithstanding the express provision of the statutes; and various other small sums, amounting in all to 25*l.* (about \$122, in American gold), per annum; and his expenses for travelling, pocket-money, &c., raise his expenditure altogether to about 40*l.* (\$194.80). The average expenses of an Oppidan may be set down at about 200*l.* (\$969), per annum. With economy, and by omitting extras, such as modern languages and drawing, this sum may be reduced to about 150*l.* (\$726.75), but under any circumstances an education at Eton must be considered an expensive one.

MODES OF PHYSICAL INSTRUCTION.*

PHYSICAL education is not peculiarly the want of our age and people. Its value and necessity have been recognized from the beginning, and all nations unite in demanding it, in a greater or lesser degree. Among savage tribes it is necessary from the nature of nomadic life. With them a fine physical development is required for success in the chase, and for

triumph in war. Among the civilized nations of the past, when war was more a matter of muscle than brain, and battle a collection of personal combats, the public games were used to provoke the development of the thews and sinews upon which the safety of the State might depend. The nation at that day, made up of effeminate men, gave way to the one whose soldiers

* 1. Manual of Gymnastic Exercises for Schools and Families. By Samuel W. Mason. Third Edition. Boston: Crosby & Nichols. 18mo, pp. 47.

2. The New Gymnastics for Men, Women, and Children, with a Translation of Professor Kloss's Dumb-bell Instructor, and Professor Schieber's Pongymnastikon. By Dio Lewis. M.

D. Fifth Edition. Boston: Ticknor & Fields. 12mo, pp. 274.

3. Hand-Book of Calisthenics and Gymnastics: A complete Drill-book for Schools, Families, and Gymnasiums, with Music to accompany the Exercises. By J. Madison Watson. New York and Philadelphia: Schermerhorn, Baucroft & Co. 8vo, pp. 338.

had a superior development. The introduction of gunpowder, by which dwarfs might vanquish giants; the application of the art of invention to war; a superior science of destruction; and a predominance of cunning over brute force in war-craft—all these led the moderns into a neglect of physical culture. Extreme civilization seemed to have developed the brain, at the expense of the rest of the body. We recognize this error now, and physical instruction is part of our system of education, not for the purpose of attaining success in hunting or in battle, but to gain and preserve health and vigor to the individual. Hence the *Turn-verein* of the Germans, the cricket-club and the field-sports of England, and the base-ball playing of this country—hence the manly games of Continental Europe. Hence we see the gymnasium. And now, to begin at the beginning of things, as the giant in Rabelais desired the ram to do with his story, we have introduced physical exercise in the school-room and in families. Recognizing its extreme importance to our children, a deep interest in the matter is taken by all classes. Agreed it shall be done, we are interested in determining, unlike the circumlocution office, the best mode How To Do It.

There are various theories held as to the best manner of imparting physical education, whether by itself, or in combination with mental instruction. Some hold that a semi-rural instruction is sufficient, and that horticultural pursuits afford the requisite exercise. Hence the Manual Labor Schools here had their staunch supporters; and hence Froebel has been enabled to extend his system of *Kinder Gartens* over all Germany, and beyond. Others postpone the matter until the parties are at, or approaching puberty, when the *Turn-verein*, the ball-club, the row-boat, or the gymnasium, are resorted to; but this class, at one time so numerous, is diminishing in numbers. Others, again, prefer to commence by gradual means, and at an early age, by light and progressive exercises, to supply the muscles with that culture which shall gradually develop their strength, and give grace, suppleness, and endurance to the whole body. In

favor of these last theorists, public approbation seems to settle; and we propose to consider the relative merits of some of the writers who provide manuals of exercise for the prevailing system—to look briefly into the minor tactics of the modern science of making war upon flabby muscles, narrow chests, spindle limbs, and drooping frames.

One of the works before us, the "Manual" of Mr. Mason, we shall dismiss summarily. An unpretending volume, it is sound as an elementary work, and, so far as it goes, good. It may be safely introduced even into primary schools, and, as it requires no balls, dumb-bells, or other physical appliances, the system it embraces may be used among even very small children, with advantage and effect. The other two books are more pretentious and exhaustive. They are both based on the same general system, or rather on the spoils of various systems; and their brief analysis and comparison may not be without interest.

The book of Dr. Dio Lewis contains not only an exposition of his own system, but nearly half of it is occupied by good translations of two standard foreign works on the same subject—"The Dumb-bell Instructor," of Professor Kloss, and the "Pangymnastikon," of Professor Schieber. In his own instruction, he uses the most varied apparatus, and takes in turn, the sand-bag, the rings, the wands, the dumb-bells, the clubs, the pins, the "bird's-nests," the arm-pulls, the crown, and the free exercise without implements, of which Mr. Mason has given such an excellent little Manual. Of all these he evidently prefers the rings; and a careful examination will show that the exercises with each of these implements are similar in character, and that their variation only arises from the nature of the implement and the attitudes employed; the effect sought to be produced in all being substantially the same. An examination will also show that two thousand years since the Greeks used, with their dumb-bells, essentially the same system; as the modern instructor now prescribes. For the exercises of the ancients were, and those of the moderns are founded on the same

principles—both having the same end in view, though the motives are different. Dr. Lewis insists strongly upon light implements, and differs from Dr. Windship, whose idea of a perfect physical condition is the ability to elevate 1000 lbs., or more, on a dead lift. He prefers flexibility of the form to mere strength; an even development of the muscles of the whole body, to an enormous enlargement of those in any particular part; and hence in his gymnasium has, for the last ten years, replaced the heavy iron dumb-bells for those lighter wooden ones now generally employed, and other more delicate and less unwieldy apparatus. But as for dumb-bells, he evidently uses them as he does the Indian club, in deference to what he thinks a mere prejudice—in the first instance arising from old use, in the latter from novelty. His preference is for the cherry-wood rings, of the exercise with which he avers: "It is difficult to conceive any possible series [of exercises] so complete in a physiological point of view, and so happily adapted to family, school, and general use."

To those who prefer the use of the dumb-bells, the treatise of Professor Kloss, in Dr. Lewis's book, will be valuable. The exercises of Dr. Kloss, though not complete, are varied and well considered. They contain all which Dr. Lewis has given in his portion of the book, and more—in fact they are a complete manual of the exercise as applied to a single person.

The Pangymnastic exercises of Schieber consist of the use of the suspended rings, and form an improvement on the trapeze, so familiar to those who have witnessed the performance of Hanlon, or other public gymnasts. They are worthy of close attention and observation, and, if properly introduced, would be popular with boys varying in age from sixteen to twenty, or even with adults, for whom they are well-fitted. For younger children we do not think them so well-adapted, unless under exceedingly careful supervision.

Mr. Watson's work differs somewhat in its character from the others. It contains a judicious selection from all the approved exercises, but it gives these in a satisfac-

tory progressive system. Commencing with vocal gymnastics, which it treats exhaustively, it goes on through exercises of the head, elbows, arm and hand, head and neck, trunk and waist, knee, leg and foot, and the whole body, first singly, and then in combination to the close. The feats with dumb-bells, clubs, wands, and rings are given in the same progressive order. Each variety of exercise commences at the initial elementary point, and advances step by step; and the same principle of gradual development previously shown in the exercises without implements, is carried out in all. The system presented is eclectic, sound, and highly philosophical.

Mr. Watson differs from Dr. Lewis not only in the better order and completeness of his system, but in exhibiting a preference for the dumb-bells, which, he asserts, "all things considered, are incomparably superior, as a means of physical culture, to any other article of gymnastic apparatus." Here is a difference between doctors, and, like most differences of the kind, must be settled by the experience of the laymen. We have given some observation to these matters, and we naturally enough prefer the practice of our own household, where our daughters generally use the rings and wands, and sometimes the dumb-bells; while our sons after a brief trial of the cherry-wood circles, abandon them for the dumb-bells alone. If we were to take the dumb-bell system as shown by Kloss and Lewis, we might still decide against the views of Mr. Watson. But the latter introduces with the implements a series of combined exercises, based upon a system so just, that he makes no vain assertion in saying that the dumb-bells act not only as themselves, but as rings, bars, clubs, wands and foils; for such, in his series of movements, do they really become. The boast of Mr. Watson becomes true, because he makes it so. The meagre exercises of Dr. Lewis give no idea of the capacity of the implement in aiding physical culture.

In comparing the physical manner of the two volumes, that of Mr. Watson has a renewed claim on our attention. Its mechanical execution affords a specimen of the luxury of printing. The engravings, profusely used, are drawn with spirit and

character, engraved with care, and used so as to illustrate the text clearly. The music, to accompany the exercises, of which there are seventeen closely printed pages, is well chosen, and faultlessly accurate. This feature is not in other works at all. The paper and type would have suited the most elegant annual—in fact the general appearance is that of a costly gift-book; and, in this respect, the volume surpasses anything of the kind ever brought before the public.

While we have thus given a fair idea of the relative merit of the works we have examined, we have this to add—that it will be no disadvantage to parents and teachers to have them all. And we have one more thing to say, namely:—that, with all this in-door calisthenic exercise, the out-door exercises cannot be dispensed

with. The dumb-bells, the rings, and the wand, are valuable adjuvants to out-door sports; but they are not substitutes for the morning walk, the foot-race, the ball-play, and the numerous wild, free, competitive games of the school-ground, in which children love to indulge, to the manifest damage of their clothing, and the great benefit of their health. We want all these. With these we want coarse, wholesome food, loose and sufficient clothing, and thoroughly ventilated dormitories. All are indispensable, if you wish to create from the children around you men and women who shall walk erect, live comfortably and long, and not merely drag out a suffering existence, never intended for his creatures by a wise and beneficent Creator.

RUDIMENTAL MUSIC;

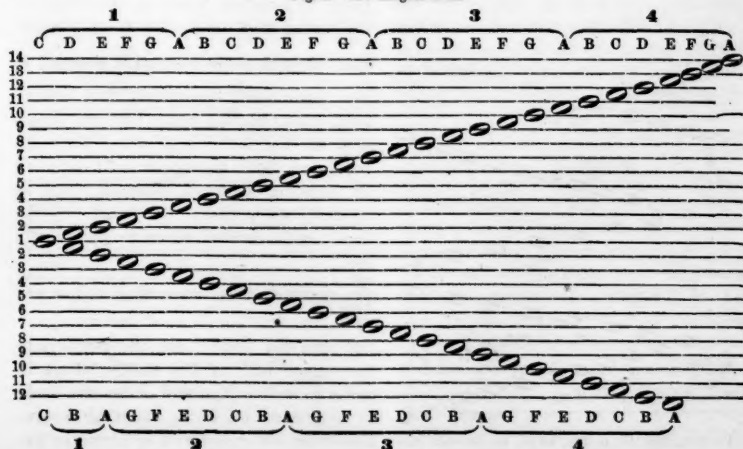
WITH A NOTICE OF SOME ERRORS IN TEACHING IT.

1. THE STAFF.

THE staff consists of as many parallel lines as are required, to represent all the tones of a given musical instrument. As the compass of each musical instrument

is more or less limited, the staff requires more or less lines. The staff for a seven-octave piano-forte, or harp, requires twenty-five lines. If these lines were all drawn as in Fig. 1, the eyes could neither well nor readily count them; hence a staff consists

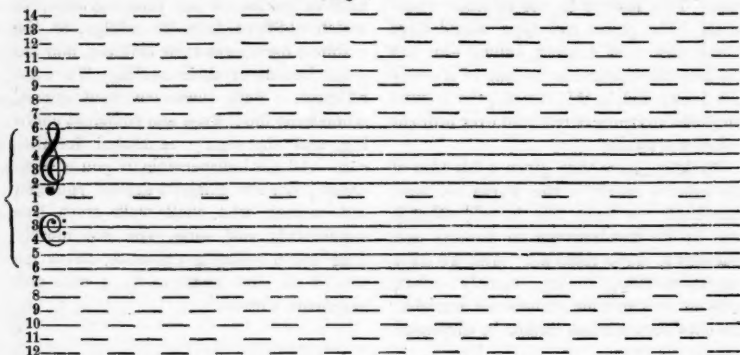
Fig. 1.—The Largest Staff.



of long, or continued, and short, or detached lines. From Fig. 2, it will be seen that there are ten long lines, separated by one dotted line, placed in the centre, and

known as the *first line*. This line, although the starting-point from which all the other lines are counted upward and downward, is only drawn of sufficient

Fig. 2.

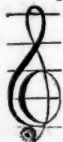


length to receive a note on, or immediately above or below it, because the eye could not conveniently count these eleven lines, if all were distinctly and continuously given. By this arrangement we obtain two halves, the *upper half* and the *lower half* of the staff.

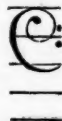
The note written on this *centre* or *first line*, represents the key *c*, also (at least unmistakably) in the centre of a seven-octave piano. The note placed above this line represents the key *d* (at the right of *c*); the note on the upper second line represents the key *e* (at the right of *d*); the note placed below the centre line—the key *b* (at the left of *c*); the note on the lower second line—the note *a* (at the left of *b*), and so forth.

When upward, *a, b, c, d, e, f, g*; when downward, *g, f, e, d, c, b, a*.

The upper half of the staff is marked,



The lower half,



Very often, for convenience sake, one or more lines of the lower half are temporarily needed for the upper half, when they are borrowed from the lower half and supplied by detached lines; or the whole of the lower half is needed for the upper

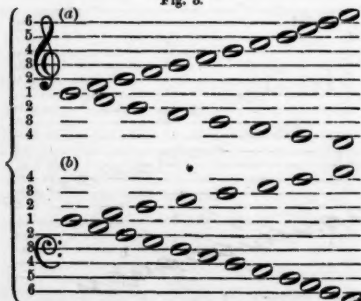
half, when there is simply *C* prefixed to the upper half; sometimes, also, one or more lines from the upper half are necessary for the lower half, when lines are borrowed from the upper and supplied by drawing detached lines, as many as needed; or, perhaps, the whole of the upper half is needed, when we find merely



prefixed, thus converting the upper

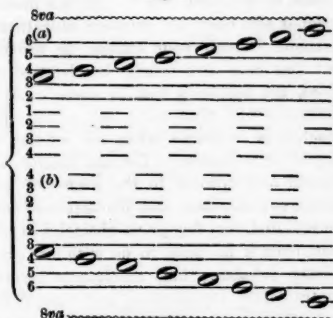
half into the lower, and the lower into the upper half of the staff. Often, in order to reduce the staff, notes are made to represent tones and keys an octave higher or lower, by writing above or below them *8va*.

Fig. 3.

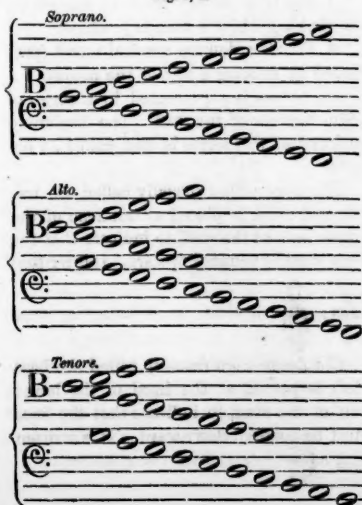


In naming the notes, keys, and tones, we use the seven first letters of the alphabet.

Fig. 4.



There is still another staff (likely the original one), the principal lines of which are ten in number, but not separated by a dotted line, still as simple in construction as the former. (See Fig. 5, *a* and *b*.) The upper half of this staff begins with the lowest of the upper five lines, which also represents the key *c*, in the centre of a seven-octave piano, but only when the music is intended for the soprano. In this case, the sign **B** is placed on this first line; but, when intended for the alto, the sign is placed on the third line, to indicate that *c* is now to be found on that (the third) line; and, when intended for the tenor, the sign is placed on the fourth line, and *c* is found also on the fourth line. It can easily

Fig. 5, *a*.

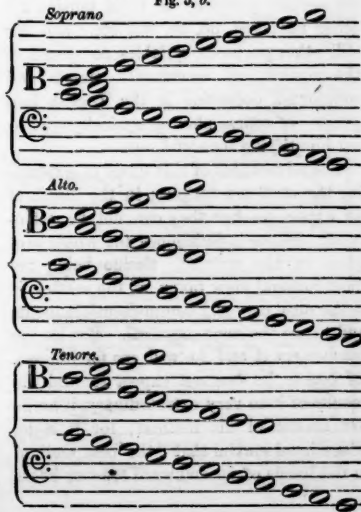
be seen that by these changes more or less lines are borrowed from the lower half; but, unlike the modern staff, so many of the borrowed lines are always drawn, as principal lines, as are needed to complete a series of five long lines; the other borrowed lines only are rendered in a detached form.

This arrangement is founded on one principle only, which is: To avoid short lines, or, in other words, to reduce the size of the staff to its smallest possible limits. The modern staff, however, supplies fully this staff, even in case of the tenor, which, when written on the upper half of the modern staff is, of course, to be understood an octave lower than written.

There are several landmarks which beginners will do well to impress on their memory:

1. The note on the centre, or first line, represents the key *c*, in the middle of a seven-octave piano. If he forgets this he would be left in the dark, and would have to wait till his teacher should come to do his work over again.

2. The sixth line, whether upward or downward, is not an indispensable landmark; but very convenient, facilitating the reading of notes written beyond it. If the beginner forget it it can be easily recovered by counting lines and keys from the centre.

Fig. 5, *b*.

3. Playing a series of notes written on successive lines only, one white key is omitted, provided there are no chromatic signs. The same is the case when notes occupy a series of spaces.

Our experience has proved to us satisfactorily that a scholar can learn to read any music at sight which his fingers are capable of executing well, even without getting acquainted with the names of the tones, notes, and keys. Is there any teacher or performer who, while playing at sight, thinks at all of the names of the notes he is playing? We think not. How, then, does he manage to read? Either he measures the distance from one note to the other, or he has long ago acquired the habit of identifying the note with its corresponding key. If this be the case, why not teach the beginner at once the way he will use eventually? Why such a long, roundabout mode? For convenience, some say. We have not room enough to show that a roundabout way is not always the most convenient. Still, suppose we teach the names of the notes—the Saxon races have adopted the seven first letters of the alphabet; the Latins the seven syllables, *ut, re, mi*, etc. Some even use the seven first numbers. Which is the best? If we name tones, notes, and keys at all, we use the letters whenever keys or musical instruments are used; the seven numbers, for certain purposes in vocal music; for other purposes, *do, re, me*, etc.; and, for still other purposes, syllables composed of the vowels and consonants, simple and compound, occurring in the English language—of course phonographically—without identifying tone and note.

The advantages of this mode of explaining the staff are various; in the hands of an expert teacher they can not be calculated, because it influences the whole progress of the scholar. Beside being the most rational view taken of the matter, it is the most easy and comprehensible mode, and hence the most practical. But let the teacher try it and he will see for himself. Of course he can not expect to find the results of it so very extraordinary, if he be not master of his method; for it is an educational maxim that "the best method in the hands of an awkward teacher bears

worse results than a bad method in the hands of a skillful one." Let the music-teacher also carry out another educational maxim: "Teach your scholar to think," or: "as soon as a scholar has learned to think the teacher's task is done." And another: "In nine cases out of ten the teacher is to blame when the scholar is stupid or stubborn." Let the teacher be careful and rational in the choice of his terms, explanations, and illustrations, and he will find very few or no obstacles in his way, even if he have to do with less promising scholars; but, ambiguous terms, contradictory explanations, and absurd illustrations, render the best pupil stupid or stubborn, according to his disposition.

DEFINITION OF TERMS.

A Staff. Definition given in the beginning of this article.

A Principal Line is a line of the staff, drawn uninterruptedly from one end of the music-paper to the other.

A Short Line is drawn parallel with the principal lines, but just long enough to write a note above, below, or on it.

A Note (specially) is a mark in the shape of the letter *O* (open or filled), indicating or representing a key of the piano.

A Note (generally) is a mark in the shape of the letter *O* (open or filled), representing a definite tone.

A Key is a certain lever of the piano, by striking which a tone is produced.

A Tone is a definite musical sound (produced by striking a key of the piano).

An Octave is represented by a series of eight degrees of the staff. The beginning and end of this series is also called an octave.

The Upper Sign (usually called the treble clef, etc.), is placed at the head of the upper half of the staff, to indicate that the lines must be counted upward. It is written



The Lower Sign (usually called the base clef), is placed at the head of the lower half of the staff, to indicate that the lines must be counted downward. It is written



HEAT A MODE OF MOTION.*

AMONG the numerous revolutions which have taken place in science since the sixteenth century, none, perhaps, excepting the introduction of the balance into chemistry, by Lavoisier, has equaled, in the importance of its results, the Dynamical theory of heat, based upon the principle that force is convertible and absolutely indestructible.

In mechanics no effects can be produced without a corresponding expenditure of energy. The lever does not create force, nor yet does it perform the work with economy of energy. If a small weight can move a large one, it must move through a correspondingly greater space. If the lever be so constructed as to require a larger weight on the long arm, this weight will move through a less space than that in the preceding instance, but the relation between the power and resistance always remains the same; a given amount of labor requires a definite expenditure of mechanical energy. By means of this law we are enabled to calculate the advantage of any mechanical power, using as our unit the foot-pound, or the power necessary to raise one pound to the height of one foot. From the mathematical demonstration of this law, by Newton, it became evident that a *perpetuum mobile* is impossible in mechanics. The gate being shut in this direction, it was presumed that the law did not apply to the so-called imponderable agents, light, heat, and electricity; and, therefore, by these we might gain a *perpetuum mobile*, that is, obtain continued power without expenditure of energy, or, in fine, create something from nothing. In fact, the steam-engine seems to approach very nearly to this. There is no evident expenditure of energy there. If you condense the steam perfectly, you find, that the resulting amount of water is the same as before its conversion, and as that is the apparent source of power, there can have been no loss. But the fallacy of this

conception is shown by the Dynamical theory, which teaches us that the true source of power in the engine lies in the heat which disappears in the cylinder; the amount entering the cylinder and that entering the condenser differ perceptibly, and the difference has been converted into mechanical action. In this way, then, appears the connection between heat and mechanical action, and we must conclude thence that in Nature there is no such thing as creation of force. "Force can neither be created nor annihilated."

What, then, is heat? If you place the end of a metallic bar in the fire, the other end soon becomes heated. Two theories have been offered to account for this phenomenon; the first or material supposes that a very subtle fluid has come from the fire, passed along the rod, and thence out into the hand. This fluid was called caloric, and its effect heat. The other, the Dynamical or mechanical, denies the existence of such a fluid, and supposes that heat, like light, is the result of vibrations communicated to the atoms of the bar, thereby considering it as simply a mode of motion. Although but lately accepted by the scientific world as conclusive, the latter theory is not altogether new. It was in a measure foreshadowed in the writings of Aristotle, Bacon, Lavoisier, and Laplace. But their views received but little respect, as they were entirely unsupported by experimental evidence, and, moreover, many facts easily understood, according to the material theory, could not be at all explained by their rude observations.

The first person who undertook to ascertain, experimentally, the true nature of heat was Benjamin Thompson, Count Rumford. This extraordinary man was by birth an American, and served against the Colonies in the Revolution. He then became Minister of War in Bavaria, by whose king he was ennobled, and after-

* 1. Heat Considered as a Mode of Motion. By John Tyndall. New York: D. Appleton & Co.

2. Principles of Chemistry. By John A.

Porter, A. M., M. D. New York: Barnes & Burr.

3. Dynamical Theory of Heat. Article in *Edinburgh Review*.

wards settled in Paris as a scientific man, where he married the widow of Lavoisier. While engaged in boring cannon at Mûnich, he was astonished at the quantity of heat generated during the operation, and immediately set himself to investigate the subject. The results of his operations he laid before the Royal Society in 1798 in a paper which mainly endeavored to answer the question, Whence came the heat? It had been supposed that the chips produced during the operation had changed their capacity for heat so as to throw it off, but this he found to be false, and by his experiment proved the impossibility of, as it were, squeezing so vast an amount of heat from so small a quantity of chips. Careful consideration of the attendant circumstances led him to believe that it could result only from friction. To determine this, he placed 18½ pounds of water, at a temperature of 60° Fahrenheit, around a gun into which he bored a hole by horse power. In two hours and twenty minutes the temperature rose to 200°, and in ten minutes afterwards the water boiled. Following this, in the year 1799, Sir Humphrey Davy took two pieces of ice into a room whose temperature was below 32° Fahrenheit. After rubbing them together he found that the resulting water had a temperature not of 32°, but of 35° Fahrenheit, which increase could have been generated only by friction, inasmuch as a transfer of latent heat becoming sensible was, under the conditions, utterly impossible.

Since these early experiments investigations have been carried on with great vigor, and many facts, previously regarded as unimportant, have suddenly assumed the highest scientific significance. When a bullet is struck by a hammer it becomes heated, and, if the percussion be sufficiently continued, the bullet will attain a red heat. Now, if we could collect all the heat generated by the blow of the hammer, and apply it mechanically without loss, we would be able by it to raise the hammer each time to precisely the height whence it fell. The motion of the hammer is not lost, it is simply converted into something else. As Dr. Tyndall states it, "Its motion was transferred to the atoms of lead,

and announced itself to the proper nerves as heat." The railway porter at the station always greases the axles. In so doing he practically testifies to the "convertibility and indestructibility of force." How so? He does not want his axles heated, for with every degree of temperature generated there a certain amount must be withdrawn from the mechanical force of his engine. Mechanical energy may readily be converted into heat, but once converted exists no longer as energy. So when the station is approached we apply brakes, convert the force into heat, which escapes from the wheels in the smoke and sparks, and the train finally comes to rest. Thus we perceive that heat is at least the result of motion; one point only is wanting to prove that it is motion itself. If heat, like light, be nothing other than motion, then by properly bringing together two rays of heat we may produce cold, just as by properly conjoining two rays of light we may produce darkness. The experimental proof of this matter has been furnished by the French philosophers, MM. Frizeau and Foucault, who have thus placed the matter beyond dispute.

Having ascertained that heat and mechanical force are mutually convertible, we are naturally led to inquire, what then is the mechanical equivalent of heat, or from a given quantity how much labor may we expect? This question has been answered in a most satisfactory manner by Dr. Joule, of Manchester, England.* This gentleman, by means of intricate and patient experimenting during seven years, determined the amount of heat evolved by stirring water with paddles, by rubbing two discs of iron together, even the amount evolved by the friction of fluids passing through capillary tubes. As the results of these and other equally wonderful investigations, prosecuted at times under the most discouraging circumstances, he proved that the amount of heat generated

* Dr. Tyndall, however, regards the honor as belonging almost exclusively to Dr. Mayer, of Heilbroun. A very acrimonious dispute, concerning this matter, has been carried on for some time in the *London Philosophical Magazine*. We cannot speak of it here at length, but must refer the reader to the last volume of that journal.

by the expenditure of a given quantity of mechanical energy (and *vice versa*) is definite and invariable. The numerical results of his labors show that if a weight of one pound fall 772 feet, enough heat will be generated to raise the temperature of one pound of water one Fahrenheit degree. Conversely, the heat necessary to raise the temperature of one pound of water one degree is sufficient, if applied mechanically, to raise one pound to the height of 772 feet, or 772 pounds to the height of one foot. This, then, is the mechanical equivalent of heat, without which, 'the theory would have been destitute of any firm experimental basis, and, therefore, unworthy of our acceptance as a sound addition to science.'

It is impossible in the space of a compendary article, such as this, to give a

complete statement of the whole theory; nor can we enter into a discussion of the manner in which the sun's heat is maintained, or of the many other interesting theories already branching off from the great original. For these we must refer the reader to Dr. Tyndall's work itself. Indeed, in view of the fact that at present we are almost entirely without a text-book on the subject of heat, instructors can scarcely fulfill their obligations towards those entrusted to their care without thoroughly informing themselves on the main points of the new theory. For this purpose, we know as yet of no works better fitted than those of Drs. Tyndall and Porter. That of Dr. Tyndall especially abounds in facts of intense interest, which, if properly employed, cannot fail to render the subject attractive to students.

PICK, ON MEMORY AND LANGUAGE.

AT a recent meeting of the London College of Preceptors, Dr. Pick read a paper upon Memory and Language, a summary of which may prove interesting to our readers, embodying, as it does, hints of some value. After alluding to a theory of memory, which he had given before to the same hearers, he went on to say that ideas which made a strong impression on the mind were easily remembered, whereas indifferent things soon passed out of remembrance. This proves that the facility of recollection depended upon the strength of the original impression. If, therefore, the things we have to keep in mind are likely to make little impression, we must see if it be possible to strengthen them, when they come before us for the first time. Now, one of the best means of doing this is *comparison*, because it compels us to examine both things we have to compare. If, moreover, we take a thing already known to us, as a starting-point of comparison for the unknown, recollection becomes easy.

In accordance with this principle, the natural, and therefore the easiest, way to

learn a foreign language, or anything else, is to go from the known to the unknown, and not *vice versa*, which is the usual way of proceeding.

The known in a foreign language is what passed from the foreign language into our own. Since philology and comparative grammar have made such wonderful progress in the last twenty years, it was very easy, indeed, to take, first, identical elements, and afterwards, such as are of common origin, as bases of comparison and teaching. To begin the study of a foreign language with the grammar was the unnatural, and, consequently, the difficult way. He did not advance the analytical methods, which began with the language, but where the pupils had to learn words or phrases like parrots. But his method was to begin with a classical text, which must be learnt by comparison. He had explained this method in full in his book on language.* He intended now to point out how the principle of comparison, and

* A New Method of Studying Foreign Languages (French). Trübner & Co., London.

the recurring to the known for helps to remember the unknown, greatly simplified, and consequently facilitated, difficulties of the grammar. Since he had made known his theories, some professors of languages had not hesitated to say, that they had done the same for years. But those same professors, though they had taught German, and published books on that language, these twenty years, now only suddenly found out that to learn certain poetry by heart "was, perhaps, the only way to learn the pronunciation." This was a wrong interpretation of his own plan. He showed, in a few instances, how a few German elements, having passed unchanged into the English language, gave the key to the whole German pronunciation. He then explained, that every language tended to shorten its elements, and to be euphonical and easy for the organs of speech. He showed how those two fundamental laws in the formation of language explained, and consequently facilitated, the irregularities of the *French* grammar. The present participle of the French grammar is formed by adding the termination *ant* to the root; for *parl-er*, *parl-ant*. This is the root for all regular verbs (except some of the second conjugation, like *finir*, &c.). But the irregular verbs depart from this rule; so, *dire*, and a number of others, form the present participle *disant*; *connaître*, *connaissant*; *voir*, *voyant*; *absoudre*, *absolvant*; *coudre*, *cousant*; *moudre*, *moulant*; *écrire*, *écrivant*; *boire*, *buvant*, &c. Others are still more curious. Some, like *joindre*, form their present participle in changing the *nd* into *gn*, *joignant*.

All these irregularities arose from the tendency of the language to avoid a hiatus. For it will be found that when the root of the word ended with a vowel, and the grammatical termination began with one, a hiatus occurs, *e. g.* *di-re*, *di-ant*; *finir*, *fini-ant*; *voi-ant*, *ecri-ant*. A consonant comes, therefore, between the two vowels, to fill up the hiatus; *e. g.* *di-s-ant*, *fini-ss-ant*, *ecri-v-ant*, &c. The future of most of those verbs is regular, because its grammatical termination begins with a consonant: *dire*, *dirai*; *écrire*, *écrirai*, &c.

As a rule, therefore, we shall know that, if the root of a verb ends with a vowel,

and the grammatical termination begins with one, a consonant will come in to fill up the hiatus.

Another particularity, arising from the tendency of language to be as easy as possible for our organs of speech, is, that consonants which are quite foreign to the word creep in between two other consonants to facilitate their pronunciation. This is especially the case with *l*, *m*, *n*, before *r*; *e. g.*, the Latin *gener* became *gendre* in French; *cinis*, *cinerem*, *cendre*, &c. If we try to pronounce the verb *éteindre* without the *d*, viz., *éteinre*, we shall find it difficult; we shall even involuntarily say *éteindre*, that is to say, put the *d* between the *n* and *r*. The same thing occurs in Greek, the genitive of *δύω*, instead of being *δύωος*, is *δύωδος*.

In many cases, therefore, we find a euphonic *d* between *n* and *r*, to facilitate the pronunciation of the *r*. In other cases the *d* is not there for euphonical reasons, but belongs to the root of the word. It is easily understood that if the *d* crept in to facilitate the pronunciation of the *r*, it will stand and fall with it; that is to say, where there is no *r*, there will be no *d*; but whenever the *r* comes back, the *d* will accompany it. This is why, in all such cases, the *d* invariably disappears in all moods and tenses where there is no *r*; *e. g.*, *éteindre*—present participle, *éteignant*; future, *éteindrai*; because the grammatical termination begins with *r*. But if the *d* belongs to the root, it does not disappear; *e. g.*, *étendre*, *étendant*, &c. But the question is, how can a pupil know where the *d* is a part of the root, and where it is accidentally there? He has only to see what the words really are. The *Latin* being the language from which the French as well as the other Romance languages formed themselves, is, of course, the best authority. But even without Latin the pupil can find in his own language what will answer the purpose. *Etendre* is the Latin *extendere*, and the English *extend*. In those words it is seen that the *d* belongs to the roots, consequently the pupil knows he will have to say *etendant*, &c., *éteindre*, in the Latin *extinguere*, and the English *extinguish*. Here we not only see that there is no *d* in the root, but we find why the present par-

ticipie is eteignant. The *d* disappearing with the *r*, the original *ng* comes back as *gn*. This is the case in all French verbs which come from Latin verbs ending in *angere*, *ingere*, *ungere*: *plaindre*, Lat. *plangere*, pres. part. *plaignant*; *seindre*, Lat. *figere*, pres. part. *seignant*; *poindre*, Lat. *pungere*, pres. part. *poignant*, &c. The future of all those verbs is quite regular, because the *r* comes back. *Vendre*, Lat. *vendere*, Eng. to *vend*, present participle *vendant*.

To know which consonant will fill up a hiatus, the pupil has equally to look back to the origin of the word; *dire*, for instance, is the Lat. *dicere*. The pronunciation soon dropped the short *e* in the penultima and said *disre* (*e* being replaced by *s* to sound soft); by-and-by, the pronunciation dropped the *s* too, and made it *dire*. The *s* remained a long time in the orthography, until Voltaire decided to drop it. But each time the language wants a consonant, the old *s* comes back to duty again. The real root of *dire* is consequently *dis*, and now all moods and tenses of it are quite regular (with the single exception of the second person plural of the indica. pres. *dites*); *je dis*, *tu dis*, *il di(s)t*, as there is another consonant, *t*, and none is pronounced, *s* drops; *nous disons*, &c.; but *je dirai*, &c.

In many cases *i* and *y* interchange; *e. g.*, *voir*, *voyant*; *je vois*, *nous voyons*, *ils voient*; *envoyer*, *j'envoie*, *nous envoyons*, *ils envoient*. We have only to pay attention to the fact that *i* easily hardens into *j*, or *j* easily softens into *i*; and moreover observe the tendency of the language to avoid a too great concurrence of vowels or consonants, and all those changes become quite regular and easy, for the *y* is no *y* in reality, but a contraction of *i* and *j*.

In *voi-ant*, the *j* comes in and makes it *voyant*; in *voient*, the *ent* being mute, the *j* is impossible.

Moudre is the Latin *molere*, which became *moldre* and *moudre*, consequently *moul-ant*.

The lecturer gave other instances; but what we have presented will serve to show the principle laid down. The essay possesses unquestionable interest as an application of scientific principles to the acquisition of languages. It is a renewed demonstra-

tion of the fact that to understand fully the principles evolved, is the most certain method of acquiring the details of a language. Mr. Robson, one of the Fellows of the College, in commenting upon Dr. Pick's lecture, said very truly:—

"Were the lecturer's system followed, there would not be such complaints as are now prevalent about the great waste of time in the unprofitable study of language, especially of the classical languages; although it might be doubted whether much of the labor bestowed upon modern languages was not equally misemployed. One great merit of Dr. Pick's remarks was that they showed the absurdity of the notions of most grammarians respecting what were called "irregularities"—that is, forms which deviate from the patterns which the grammarians chose to call "regular." These so-called irregularities were treated like rebels against constituted authority, and regarded as unaccountable deviations from the legitimate and proper standards of language. Nothing, however, could be more unfounded than such notions, the origin of which was the idea that it was for grammarians to lay down the laws of speech, and to reduce all the phenomena of language to these rules, so that whatever could not be made to accord with them was to be called irregular. Modern philologists have truer views of their functions, which consist in observing and studying all the facts of language, and in endeavoring to deduct the general principles involved in them, the bases of them all being the same, the mental and physical constitution of man. Philology therefore discards the term "irregularity" altogether, though it may often have to confess that certain forms and modes of expression defy analysis and explanation.

So valuable do we consider Dr. Pick's essay, that we regret deeply the lack of room which forces us to compress the most available points only into a brief space. The common system of grammatical instruction in languages, whether ancient or modern, gives but a poor knowledge of language, and affords little mental discipline. A study of the growth of a language commencing at its earlier forms, and passing to those now existent, imparts a thorough knowledge of its structure, and

is a mental training of great value. You have an association of ideas as well as words, which in the usual modes you have not. Whether they are disposed to agree

with Dr. Pick, or not, our teachers will find his views of practical service, and may gather from them much to interest and instruct.

A FOREIGN VIEW OF US.

IT is always interesting to know what others say of us, presuming they say what they think. Should they speak ill, whether they do it illy or not, the censure may be of service in calling our attention to some fault. Should they praise us, we may look to see if their praises are not ill-founded, and therefore unintentional satire. When the Reverend Mr. Fisch, after spending nine months recently in the United States, wrote a book about us,¹ we waited to see what he said about our system of education, for that is our special subject of interest. And we have it. A very favorable view it is. The reverend gentleman sees our school-system through rose-colored spectacles. "Every thing is lovely." He asserts that our schools "are incomparable. In this direction, at least, they [the people of the United States] are at the head of civilization." If Dr. Fisch be good authority, we have no need to trouble ourselves any farther. Having arrived at *ne plus ultra*, how can we get beyond? How is it possible to farther perfect perfection?

"Governments," says the reverend Doctor, meaning thereby those of the several States, "shrink from no expense in the matter of public instruction. The budget of education takes precedence of all others. In some states—in Maine, among others—one third of the taxes is appropriated to this object, and it is with pleasure mingled with pride, that the citizen sets apart the sum society demands of him for this noble purpose. When a new State is formed in the West, each district appropriates to its schools large grants of territory, which increase in value as the country increases in population. Sometimes these consti-

tute property of enormous value. Private individuals, in their turn, endeavor to outstrip the munificence of the State. In all directions, by the side of the public schools are to be seen others founded by private liberality. Here it is a Mr Putnam who makes a donation of £15,200 sterling to build an academy at Newbury Port; there it is a certain number of citizens who collect among themselves £17,000 to defray the expenses of a magnificent academy at Norwich. There again it is a New York merchant who, in the midst of last year's commercial crisis, gave £50,000 for the construction of a splendid college for young girls near Poughkeepsie, upon the banks of the Hudson."

This is fairly stated enough, though there are a number who pay their school taxes with any thing but "pleasure mingled with pride." There is a school section of land given by the general government in every township, for school purposes; but every district, on the formation of a new State does not set apart "large grants of territory"—more is the pity. Each district could not do a wiser thing; but districts are not always wise.

The reverend Doctor is struck with the social position of teachers, and says—"the rank teachers occupy in society is the surest indication of the importance attached to instruction. In America, their vocation is held to be not less august or less efficacious than that of the pastor." But he misapprehends the affair altogether. It is not particularly the vocation, but the man who is respected. A gentleman of education and of fine manners is received in society, not because he is a teacher, but for his social qualities, without reference to his profession. The vocation is respected, because it is respectable; but its followers are respected solely when they deserve it

¹ Nine Months in the United States, during the Crisis. By the Rev. Georges Fisch, D. D. London: Nisbet & Co.

as individuals. If a teacher is coarse, vulgar, or even bad-mannered, his profession will not make him sought for socially. He would be set down as a common fellow who set copies and whipped little boys. Such a man would not be in social request any where.

After some other remarks the reverend Doctor goes on to say that—

"It is the woman that stamps the real character of the family. It is she that is the great educator. We may even go the length of saying it is she that gives the measure of a civilization. Now, nowhere is woman more respected than in America, and nowhere does she deserve it better. The American lady is, generally speaking, lively, intelligent, graceful, and dignified. The Miss Ophelia type is only to be met with in New England, and even there is becoming more and more rare."

Our women should feel obliged to him for this compliment, which it is to be hoped is as just as it is gallant.

"The American women are better educated than those of Europe, and are altogether free from pedantry. Their ambition is to be accomplished housewives, but they pass with perfect ease from the kitchen to the drawing-room. In the Western States they are compelled to submit to the most irksome labor; but after having kneaded and baked the family bread with their delicate hands, they can take their place at the piano, or read a work on metaphysics."

Kneading and baking bread are not regarded as very irksome, in the rural districts; and in the cities families generally depend on the baker. We do not think, however, that our housewives as a general thing, alternate their time between bread-making and metaphysics. A calamity so severe has not befallen the United States.

"Accordingly [why accordingly?] respect for women in America is what it was with us in our days of chivalry. In Europe those traditions are rapidly passing away. This respect for women exhibits itself in the smallest circumstance. The moment a woman enters a public carriage, the men rise at once to offer her the best place [of course; and sometimes the wo-

man is well-bred enough to at least bow in acknowledgment of the courtesy.] A young girl might safely travel from one end to the other of the United States in those immense wagons of the railway which have but one class and one compartment, without incurring the least risk of hearing one unbecoming word. She is under the very best protection—the protection of every one. If any European novice attempted to fail in respect to her, he would be in danger of expulsion at the next station.

"American morals are the result of strong religious convictions, permeating the habits, sentiments, and inner life of the nation. With the exception of Washington and New York, two cities which are almost European, one breathes a moral atmosphere in America entirely unknown to our old world. It is this that renders innocuous the perfect liberty enjoyed in all relations of life. Every evening, young men and young girls, who have been college or school comrades, meet in each other's saloons, and are left together without any kind of superintendence, as though they were brothers and sisters. Young men find in this daily contact an influence that nothing else can supply, a healthy moral atmosphere that saves them from many dangers; many of them owe to it their first religious impressions. Hence it is that marriages are well-assorted, being neither the result of financial combinations nor sudden passion, but prepared by mutual feeling and a thorough acquaintance, which have had time to ripen.

"The family in America is likewise influenced by the geographical circumstances in which this singular people is placed. Each family feels that it harbors but for a few years, beings destined to be separated from each other by enormous distances. New England parents know well that the chances are that one son will one day go and colonize Iowa, Wisconsin, or the Minnesota, in the extreme Northwest, that another will seek his fortune in San Francisco, another in New Orleans; and that the daughters will be married and settle hundreds or thousands of miles away from the paternal roof. This prospect reacts upon education, and gives it a more disinterested character; under such circum-

stances, it would be madness to bring up children for one's self. The aim, therefore, is to bring them as rapidly as possible to that stage where they can dispense with all guidance.

"In like manner do political institutions react upon the family. In constituting itself a separate nation, the American branch of the Anglo-Saxons has developed still more that type of strong, decided individuality which belongs to the whole race. It has repudiated all factitious inequalities and unnecessary impediments likely to obstruct individual will. Its aim is that each citizen shall be able to bring into play the full measure of force with which he is endowed. The security and prosperity of the State are based on the direct action of individual wills; every thing is elective. The citizens themselves elect their magistrates and judges; the soldiers elect their officers. [Only in the Militia on the peace establishment. In actual service, it is rarely if ever done]. Each American feels himself personally responsible for whatever takes place in the Republic, of which he is one of the active forces. It is therefore necessary to begin at an early age the task of self-direction.

"The consequence of this is, that the ideal of education in America is the very reverse of ours. Our aim is to break down the will at the risk of destroying it. In the United States, on the contrary, the object is to give increased energy to it, even though the principle of authority should be sacrificed. Parents consider themselves merely as depositaries, charged by God to watch over immortal beings, whom He has formed and fashioned according to His good pleasure. This compound of various qualities constituting an individuality is a work of the Creator before which they bow with respect. They command no farther than is necessary to render the child governable. And as he grows up, they retire into the background, exhibiting an amount of self-abnegation that is really wonderful. It is the young people that take the lead and give the tone to conversation; it is they who do the honors of the house; it is they who are foremost to give an opinion. One might say that in a country looking so much towards the fu-

ture, the young are allowed to have the precedence over all other ages of life. When parents begin to find themselves growing old, they quietly submit to live in their own houses in the life of their children. Their voices are no longer heard vying with the noisy concert going on about them. In reality it is less frequently the parents who protect the children, than the children who patronize the parents.

"Evidently this education is incomplete; accordingly religious men are profoundly concerned on the subject. Hitherto their attention has been so absorbed by the slave question, that it was impossible for them to attempt thorough and efficacious reaction in any other direction; but as soon as that matter is settled, they mean to apply their energies to the reform of domestic education. In fact, the result of the shortcomings we have noticed is to relax still more the family ties, which are already endangered by the force of circumstances. Respect for our superiors, which is rapidly disappearing in our European world, has almost died out in America, or if it still exists as a feeling that has its foundation in human nature, it is in a shape so capricious and so fugitive that it cannot be counted on. The idea of authority does not exist. When the American obeys the guides whom he has chosen, he thereby means only to obey himself. Besides, this kind of education robs youth of much of its charm. The modesty and grace that naturally belong to the young girl may temper this free-and-easy style which makes her a woman at sixteen, but this precocious assurance is absolutely intolerable in young lads. There are no youths in America; they are little men, who at fifteen have decided views upon all subjects, a political party to which they are sworn, and a thorough persuasion of their own infallibility.

"Fortunately for this great people, their system of public instruction serves as a corrective to their private education. The latter fortifies the will—the former aims at rendering it supple and pliant. The most absolute obedience and the most rigid discipline prevail in all American schools. This contrast is easily explained. In ordering their schools with a sort of

regimental unity of action, it is no part of their design to weaken the principle of individuality. In fact, the greater the number of children the more impersonal becomes the rule. Discipline is of itself established in the schools, which are, generally, very numerous attended. There is something in this common level to which all are subjected—in the word, the gesture, which makes a hundred wills move at once simultaneously—that pleases the imagination of the child. He vaguely understands it must be the same in the great world in which he is destined one day to take part. In this individuality-loving society, wherein the State leaves so much to the initiative of private persons, it has taken care to keep public instruction in its own hands. True, it has not made it obligatory. It has purposely avoided the system adopted in Prussia. The application of fines and imprisonment in order to enforce an inestimable benefit was repugnant to a free race, jealous, above all things, of the rights of the individual. But the same result was obtained by means worthier of the end to be accomplished. The State offers a truly superior education to all gratuitously, and such a boon it would be madness to reject. Every child receives complete instruction, such as prepares him to enter the special schools, or the university, without it costing his parents a farthing even for pens and paper. The knowledge here acquired is solid enough for the rich man's child and sufficiently simple for the poor. At New York the son of the Irish workman may be seen seated side by side with the son

of the banker of prodigious wealth. [Very rarely, we fancy.] The expense of this education being defrayed by the public revenue, principally falls on those classes already the most taxed; [the Doctor's ideas of political economy are a little cloudy here;] but they willingly pay, in order that the advantages of instruction may be diffused among that portion of the population that are least favored. As for themselves, they send, by preference, their children to the public schools, knowing that nowhere else could they find such distinguished teachers."

If the writer be correct in this last supposition, the numerous private schools that are scattered over the country, must have nothing to do. But he is by no means correct. Our wealthiest people do not send their children to the public schools, as a class, although many do. On the contrary, they pay large sums for instruction at the various boarding-schools, and at the numerous country colleges that are only grammar-schools of a higher grade. Exclusiveness in education, as in everything else, is as marked in this country as in any other—more so than in some.

With all its errors, that part of the Doctor's volume referring to education in this country, is so genial, so evidently desirous of looking at everything from the most agreeable stand-point, that although we may ignore his premises and deny his deductions, we read with a deal of interest, and with that sensation of half pleasure and half annoyance one feels at being praised more than our judgment feels is deserved.

MY QUEER PUPIL.

LIKE the author of "Ran Adkins," I was clerk and salesman in a country "store," with this difference—he resided in western Virginia, and I in New Jersey. Unlike him, I was not a volunteer in the service of instruction; nor was I a cadet, regularly educated for the purpose; neither had I been drafted. I went in as a sub-

stitute. I had received a very good education, but the family plan of giving me a profession was broken up by the insolvency of my father. I was intended for a lawyer, and should have been a poor one. I have made—so they tell me, and I believe them—a very good teacher. I was one for years, and am yet; though, as I occupy

the chair of Natural Philosophy and Chemistry in a college—which is little more than a chartered High School—they call me Professor. The title is a matter of no moment. Words are cheap. In Germany they call every traveller who wears a decent black coat and sports spectacles, Herr Professor. We are nearly as liberal as the Germans. And now to my story.

Jack Summers, the school-master of the village, was as unlike a modern teacher as possible. He smoked a long pipe during recess, using chewing-tobacco shred fine; chewed pig-tail during school-hours, depositing the result of his labors, in that line, in a box of saw-dust at his right hand; sang extravagant comic songs at evening parties; and was everybody's right-hand man at a frolic. He had a "gift," however, in the way of imparting instruction; and the boys and girls got on so fastly under his directions, that, although grave people shook their heads at mention of his faults, they agreed he could not well be replaced. Great was the chagrin of all when they learned that Jack was to be absent a month to settle the affairs of a dead brother in Philadelphia, and possibly might not return at all. He desired to get some one to take his place, "to keep it warm for the owner," as he phrased it, should he return. This was difficult. But we had very little to do in the store just then, and my employers suggested that I might fill the gap. I demurred, but finally yielded. I attended the school during the three days prior to Jack's departure, in order to make myself acquainted with the routine of instruction. On Friday he left, and a holiday was given until the following Monday.

The pupils were about like pupils everywhere, in point of capacity and docility, except one. This was Jeremiah Van Beber, the son of a farmer who lived about two miles from the village. He was, Jack informed me, stupid to a degree. He would persist in coming to school, to Jack's annoyance, though he could apparently be taught but little. He was about sixteen, big-headed, long-limbed and square-set. He could out-run, out-jump and out-fight any two boys of his age. With all this he was arrogant and self-reliant, and with all this, in spite of rules and in defiance of

correction, would whittle in the school. In fact, he whittled everywhere. His jack-knife was his constant companion, and always in requisition. Jeremiah was making something from one week's end to another. Now it was an extempore water-wheel—to be operated upon by the brook in front of the school; then it would be an axe-handle. His knife was rarely idle, and his lesson was never learned.

Jerry heard of the change of masters with disgust. I had had a little difficulty with him about a dry-goods box, which he wanted for some purpose, and which I would not give him. I anticipated trouble with him; though, as will be seen, I was mistaken there. I did not share Jack's opinion as to his stupidity. Jerry's face was generally dull, but I had noticed that when the usual crowd, who sat upon the store porch on Saturday afternoons, were discussing political and other questions, his eye would light up at every smart or keen saying—and these were not uncommonly uttered by the disputants—and now and then he would venture a question that showed he comprehended quite clearly the matter in dispute. There was something wrong, but it was not stupidity.

Monday morning came, and at seven o'clock I was at the school-house, although school did not open until eight. In that place, in those days, ten weary hours were passed in the school-room, from eight o'clock in the morning until six at night, with an hour's intermission, at noon, for dinner, and no play-hours. I introduced recesses in the morning and afternoon of thirty minutes for play, and had hard work to maintain the innovation against the clamor of parents. Before eight the pupils came in, and all were generally at their desks at the hour for opening.

Jerry, though so old, was in the lower classes, and generally at the tail end. He read tolerably well, and wrote fairly; but he was a poor arithmetician, and his spelling was wretchedly bad. Some of his achievements in that way would have delighted the lovers of phonetic orthography. He spelled "canteen" thus, *knten*, and "disease" *dez*, which last I thought to be a triumph. And neither reproaches or coaxing had any effect upon him. Teach

him as you would, he would return to the same state of ignorance in twenty-four hours.

As I have said before, Jerry's jack-knife was in constant requisition; and it was not long before I discovered that he was constructing some machine at home. After a deal of persuasion on my part, he consented to let me look at it; and after I had inspected the queer collection of levers and wheels, he let me into the secret.

Jerry had discovered perpetual motion. It had been left to a Van Bebber to solve a problem that had baffled the learned.

After a farther examination of his machine, I discovered one defect only—a bad one. It would not move without great trouble; and when set in motion, wound itself up in a little while, and came to a dead stop. This, in my opinion, was a serious defect under the circumstances.

I enlightened Jerry on the salient points of natural science as speedily as possible, and in a half hour's lecture, knocked into his head a few points that astonished him. I began a regular course of lectures on Mechanical Powers in the school, using the simplest language and the plainest illustrations. In about two weeks' time, I not only succeeded in putting all ideas of perpetual motion out of Jerry's head, but I did more. I started him on the road to knowledge. Jerry's mind had been filled with his one idea, to the exclusion of everything else. Hence there had been no effort to acquire ordinary facts. He took to his studies kindly enough after, and though he did not particularly distinguish himself, soon came to the level of the rest of the school in rudimental knowledge.

After leaving the school I lost sight of him. He was apprenticed to a white-smith and bell-hanger in Philadelphia, and there served out his time. He finally did acquire some distinction, though I only knew it recently, when I was introduced to a Mr. Van Bebber, who had made a large fortune through a number of his patented inventions. The face seemed familiar, but I could not place it at first, in my memory. I recalled it readily enough when Mr. Van Bebber took out a pencil and wrote the following upon a card:—

"Jerry is indebted to you for a cure of

what threatened to become a serious mental dzz."

The only moral I can draw is—that the surrender to a single idea, may sometimes give a pupil the appearance of stupidity.

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HYPERCRITICISM.

A correspondent, residing in Illinois, sends us two queries, which he propounds with evident satisfaction. He says:

"In your remarks to 'contributors,' last month, you say that 'the practice of underscoring certain words to be italicized, is a bad one.' Please tell us what we should do when we wish to have a word or sentence so printed as to indicate emphasis?"

In an article entitled "To contributors," which appeared in the September number of this Magazine, we did say that "the practice of underscoring certain words to be italicized is a bad one." The paragraph was five lines longer, and the compositor finding it necessary to treat it as Procrustes did his unwilling guests, in order to just fill the page, cut the tail off without consulting us. Thus we stopped short of conveying our meaning. Had he placed the words "unless in the case of quotations from foreign languages, names of things that custom requires to be so distinguished, or with words that are meant to be emphasised without having inherent emphasis"—our meaning would have been plain enough.

The question of our correspondent almost answers itself. If your word is not placed, or your sentence not so constructed as to indicate the emphasis required, your language is weak. To pepper your paragraph with italics in order to call attention to the points made, is to show that your sentences have no force, or that you suppose your readers to be noodles who must

have ideas shot into them in the shape of leaning letters. A very clever article was sent to us for last month's number which we printed. In the MS, at least one-sixth of the words were underscored, if our memory serves us rightly, and we simply directed the compositor to pay no attention to the black lines at all. The paper appeared, and when printed was seen to have required no indications of emphasis.

Our correspondent puts another query as follows:

"In the extracts you make from Collard's 'Practical Hints' such expressions as these occur:—'The setting of several sums on the blackboard.' 'The teacher has the answers of the sums given.' 'A quick way of setting sums.' Is it proper to use the word 'sums' in such cases? For example, the teacher gives the pupil a sum in addition. How many are 9 and 6 and 3? This is the sum. The result, or sum, is 18. That is, the sum of the sum is 18. Do you regard this as proper and worthy to be commended?

The querist will remember that we gave the quotations because they contained some hints of value, and did not find it necessary to express any opinion on the structure of sentences, or the character of phrases. On such matters we thought that most of our readers were possessed of sufficient sense and knowledge to judge for themselves, and did not require us, when we trotted out a brown, bob-tailed horse to say—"Ladies and gentlemen, this is a horse; his color is brown and his caudal extremity has been abbreviated." Still, since it seems to be a matter of interest to our worthy friend, we will give our opinion. We think the expressions not so precise as some others, but they convey the meaning of the author very clearly, and although we shall not tell all our readers so, we inform our correspondent that one of the uses of language is to convey meaning. The word "sum" is commonly used as equivalent to "arithmetical problem," while "working a sum," and "setting a sum," are phrases almost as old as the English language. Our correspondent, too, is not so precise as he might be. He says

"The result, or sum, is 18. That is, the sum of the sum is 18." Nothing of the kind. Eighteen is the sum or total amount of the three given numbers; and the sum or problem given was to discover the sum, or amount obtained by the addition of those given numbers. And the teacher does not exactly give a sum. He "sets a sum" or "proposes a problem," or "puts a question in arithmetic." In the instance furnished, 18 is the result of the sum or problem; the sum of the numbers named, or the answer to the question propounded. We prefer the word "problem," but if others, bred after the old fashion, use "sum," it is merely a matter of taste, calling for no special animadversion.

Has any body other questions to ask? Feeling ourselves as full of wisdom as Jack Bunsby, we are ready to be tapped by all inquisitive readers.

A REASON BY INFERENCE.

A correspondent desired to know why we used the word "firstly" in our last number, in a certain sentence, rather than "first." There is a negro song which says:

"Dey used to call him Sambo
Bekase it was his name."

We used it to qualify a verb, and for such a purpose we have a prejudice in favor of an adverb rather than an adjective. Possibly he thinks our language would have gained in truth, by cutting off the "ly."

THE TEACHER AND THE PLAYGROUND.

IN the mid-summer examination of students at the Normal College of Cheltenham, among the other questions propounded, was, "Why should school be made attractive to children?" and the examiners were directed to give some of the means by which a teacher might make school a happy place. As a matter of course, there was little variance in the replies, and that chiefly in matters of detail. Stripped of

their words, the points made tended to one end, the institution of kindly and friendly relations between the teacher and the children. There was one suggestion, however, from which we must dissent. The answer states—"In their games they" [the children] "should be left alone." Children should not be left alone entirely in their games. If they be engaged in the usual standard games of children, top, ball, &c., they should not be interfered with, so long as they pursue the even tenor of the sport. The teacher should keep aloof, except his judgment be asked for in a matter of dispute; and a teacher who wishes to strengthen the personal attachment of his scholars, will not only be ready to give such an opinion, but will let the fact of his readiness to give it be indirectly known. Indeed, in the more athletic games, such as leaping and base-ball, it is good policy for the teacher to occasionally join. If he have tact, he can do it without lowering his personal dignity or impairing the respect due to his authority. A parent can join in his children's sports at times, with manifest advantage, and a schoolmaster should remember that for the time being he stands *in loco parentis*. And in all games there should be a silent, if possible an unseen, but nevertheless, an actual supervision, or

the teacher may find that the play-ground, beside improving the health and strengthening the body, has become a nursery of bad manners and worse morals.

OUR SCHOOL FURNITURE.

WHATEVER may be our shortcomings in thoroughness of teaching, or whatever may be the defects in the prevailing system of instruction, there can be no doubt that the American common schools, even of the lowest grades, are more fitted with physical conveniences than those of other nations. In England, boys sit on forms, or benches, and have no desks before them. A recent circular of the French Minister of Public Instruction points out various reforms, and urges teachers, if possible, to so arrange affairs that boys will not have to do their writing upon their knees! In this respect we have done none too much; but the English and French have done too little. If we can improve the system of instruction—and we are in a fair way toward such a result—in the same ratio with our improved appliances of teaching, we will be able to point out instruction in the United States, as a tolerably near approach to perfection.

SCIENCE AND THE ARTS.

—Professor Helmholtz, in one of his lectures before the Royal Institution, when treating of the origin of solar and stellar heat, has propounded a theory of the formation of sun spots, which, he asserts, has the advantage of reconciling telescopic observation with Kirchhoff's theory, whose wholesale overthrow of astronomical work he does not endorse. Of the different mixtures of chemical elements given off by the glowing white-hot sun, some are more volatile than others; hence glowing vapors

arise which are condensed into a "fog," as it were, by cooling; and our sunlight is obtained from the glowing particles of which these banks of fog are composed. Now the vapor of water is transparent, and the enormous evaporation which it allows is sufficient not only to permit of the reduction of the underlying surface to a comparatively red heat, but to tone-down the heat of the surrounding "fog;" so that, from our standpoint, the transparent part of the sun's atmosphere, filled with the vapors of

water, shows us an underlying, comparatively cooled surface, fringed with a belt of cooling vapors.

—In the Proceedings of the Royal Society, of England, No. 63, Dr. T. Phipson reports some interesting reasearches on the metal magnesium, now becoming so interesting in relation to its illuminating properties. He states that magnesium is capable of reducing silicic acid at a high temperature, which the alkaline metals, sodium and potassium, cannot do, as they volatilize before the crucible attains the proper heat. It decomposes carbonic acid from dry carbonate of soda, and it precipitates nearly all the metals from their neutral solutions. Unlike zinc, it will not unite with mercury at the ordinary temperature of the air. Magnesium will be found a useful metal wherever tenacity and lightness are required, and where tarnish is of no consequence. It is especially valuable in the laboratory for effecting decomposition, which sodium and potassium cannot effect on account of their greater volatility.

—Dr. Crace Calvert, in his concluding lecture of the Cantor course, delivered before the English Society of Arts, called attention to the same metal, and showed the brilliant light which the combustion of wire made of it affords, pointing out at the same time the special quality of the light as an illuminating agent for photographic purposes. Mr. Claudet, at the close of the lecture, illustrated its value in this direction by taking several successful photographs of the bust of the Prince Consort in the ante-room of the society's lecture hall, illuminated by the burning of this material. The time of exposure in the camera was only thirty seconds, and much interest was excited among the audience. It was stated that the manufacture of the metal commercially had been undertaken by Messrs. Johnson & Malthey, the well-known metallurgists, who are prepared to supply the wire at the rate of 21s. per ounce, the ounce of wire being one hundred and twenty feet long.

—Gun-cotton still attracts great at-

tention among European scientific men. Mr. Scott Russell has ascertained, by direct experiment, that in disruptive explosion its strength is six-fold that of good gunpowder. Twenty-five pounds of gun-cotton, confined in a cylindrical shell, sixteen by twelve inches, completely shattered a powerful stockade, such as is used in fortifications. Professor Abel, chemist to the British War Department, has shown, however, that its gaseous products corrode metal, and although its disruptive power is much greater, yet its projectile force is much less than that of gunpowder. Therefore he thinks that we are not yet in a condition to adopt it as a substitute.

—*Poggendorff's Annals* contain a paper from which M. Magnus remarks that if a little sodium is introduced into a non-luminous gas flame it becomes luminous, and, at the same time, its heat-radiating power is augmented. The flame must have lost heat in vaporizing the sodium, but still it emitted nearly one-third more heat. If a plate of platinum was introduced, instead of the sodium, the radiation was still greater. When a little sodium was placed on the platinum the effect increased, and a still greater augmentation of emitted heat occurred if some sodium was introduced into the flame below the platinum. In the latter case three times as much heat was radiated as when the flame was used without any addition. From these experiments M. Magnus concludes, that solid bodies radiate much more heat than gaseous bodies, and consequently he thinks that solar heat cannot reside in a photosphere composed of gas or vapors.

—Mr. Grove, of the Royal Society, having perceived that with the oxygen and hydrogen, resulting from the decomposition of water by ignited platinum, there was always mingled some nitrogen, was led to initiate a more careful examination of the phenomenon of boiling. He found that water freed from air and boiled in a vacuum, boiled, not in the ordinary way, but like sulphuric acid, in bursts, between each of which the surface was tranquil. By means of carefully arranged apparatus he ascertained that, after condensing the

vapor resulting from the bursts, there remained a small bubble uncondensed, which proved to be nitrogen. He then boiled bromine in a vacuum, and found, after condensing the vapor, a quantity of permanent gas in the tube, which proved to be oxygen. Other experiments gave like curious results. Hence he concludes that boiling is by no means, as commonly supposed, a simple separation of the cohesion in the molecules of a liquid from distention by heat, but is a much more complex operation, resulting from the extraction of some permanent gas, against which the liquid evaporates. As nitrogen is eliminated until the last drop is boiled off, Mr. Grove thinks that there may be some hidden relation between air and water, and that nitrogen is by no means merely an inert diluent in respiration.

—To obviate the inconvenience and danger arising from the present form of footlight employed in our theatres and lecture rooms, M. Soubra has perfected a very ingenious invention. He takes a wide glass tube, bent in form of letter U, one leg, however, is considerably shorter than the other. Just inside the shorter leg an Argand burner is inverted; and the longer leg of the tube being heated for a short time so as to rarify the air in it and cause a downward current in the short leg, the Argand burner is lighted, and the flame, following the direction of the current of air by which it is surrounded, continues to burn upside down. The current, when once established, is sustained by the heat from the inverted flame. The advantages

as to safety, &c., of this invention are so great that it has been adopted in Paris, and will soon be commonly used in this country.

—Professor Husley says that the best mode of comparing skulls is to determine the "basi-cranial axis"—a line drawn within the skull from the front of the occipital foramen to the anterior end of the sphenoid bone—by making a vertical and longitudinal section. In some of the prognathous skulls of the lowest human races the distance from the front end of the axis to the back of the cerebral cavity is only four times as great as the distance to the front of the cavity; while in some of the most highly developed races it is seven times as large. The Professor regards this greater development of the posterior position of the brain in the higher races as entirely subversive of the location of organs as adopted by phrenologists.

—Dr. Tyndall, in his fourth memoir on heat, read before the Royal Society, June, 1863, states that, under pressure of one atmosphere, the absorptive energy of olefiant gas is nine hundred and seventy times greater than that of air, and that ammoniacal gas is almost absolutely impervious to radiant heat. If our globe were surrounded by a shell of olefiant gas two inches thick, this shell would offer only a slight obstacle to the passage of the sun's rays, but would cut off one-third of terrestrial radiation and return it, so as to keep the surface continually at a stifling temperature.

MISCELLANY.

—Professor Tyndall, in a discourse at the Royal Institution, commented upon the fact that the ugly word "physicist," and inconvenient combination "natural philosopher," are the only ones in our language which define a man battling with physical science. Professor Tyndall covets the word "physician." Professor Thom-

son, in a note to his paper on the "Rigidity of the Earth," about to appear in the *Philosophical Transactions*, wishes to generalize the word *naturalist* into the meaning given by Johnson—"a person well versed in natural philosophy." We fear the word is too convenient and too rooted, in its restricted sense, to have its meaning ex-

tended, although, we confess, the sooner such an "un-English, unpleasing, and meaningless a variation from old usage as 'physicist'" is superseded the better. We give another conservative note of Professor Thomson's as we find it:—"Dynamics, meaning properly the science of force, and there being precedents of the very highest kind—for instance, in Delaunay's *Mécanique Rationale*, of 1861, and Robison's 'Mechanical Philosophy,' of 1804—in favor of using the term according to its proper meaning, the modern corrupt usage, which has confined it to the branch of dynamical science in which relative motion is considered, being excessively inconvenient and vexatious, it has been proposed to introduce the term 'kinetics,' to express this branch; so that dynamics may be defined simply as the 'science of force,' and divided into the two branches, Statics and Kinetics. The introduction of this new term, derived from *κίνησις*, *motion*, or act of moving, does not interfere with Ampère's term, now universally accepted, 'kinematics' (from *κίνημα*), the *science of movements*."

—Madler, of Dorpat, makes the following proposal for the union of the Julian and Gregorian Calendars: The length of the mean tropical year being $365\frac{41}{10000}$ days, it follows that a period of 128 years must contain 31 leap and 97 ordinary years. If, therefore, as is done now, every year which can be divided by four is made a leap-year, but after every 128 years a leap-year is transformed into a common year, the desired result is achieved. Since, however, the beginning of this period of 128 years may be fixed arbitrarily, it would be best to commence it at the time when the Gregorian calendar likewise omits the leap-year, viz., in 1900. The following would, accordingly, not be leap-years, but common years, according to the proposed general united calendar: A. D. 1900, 2028, 2156, 2284, 2412, 2540, 2668, 2796, 2924, 3052, 3180, 3308, 3436, 3564, 3692, 3820, 3948, 4076, 4204, 4332, &c.

—Dr. Seemann, who has been several months in Venezuela, for the purpose of inspecting an estate of 100 square leagues

on the banks of the river Tocuyo, has returned to England by the last West India steamer. Whilst exploring the valley of the Tocuyo, he has discovered what may prove of the utmost importance to the railways and steamers now establishing in that part of the world—extensive coalbeds, the coal being valued in London at thirty shillings per ton, and resembling the best Welsh steam coal. This part of South America is as yet little known, but abounds in natural wealth; in it are situated some of the richest copper-mines in the world—those of Aroa, to which an English Company is now making a railroad, sixty miles in length, ten of which have already been finished. The soil is of extreme fertility, and mahogany and other precious woods abound.

—The Spanish journals mention the outbreak of a dangerous malady in the city of Murcia:—In constructing the railway which passes through that place, a large mass of earth was excavated from the neighborhood of the city for the purpose of making the embankments. At the spot whence the earth was taken, a quantity of stagnant water has since collected, the malaria from which is said to have produced an epidemic fever, with all the characteristics of a plague. More than 1,500 persons in Murcia and the environs have been attacked, and a large number of deaths have already taken place. A manifestation against the railway company, by the population, lately took place, and more serious disturbances were feared.

—Mammon's throne was illy served when in Archbishop Whately's presence. He weakened its influence and grasp rather by the scorch of his caustic wit than by any violent muscular effort to subvert the one or unlock the other. "Many a man," he said, "who may admit it to be impossible to serve God and Mammon at one and the same time yet wishes to serve Mammon and God; first the one, as long as he is able; and then the other."

—The French government has granted the sum of 200,000 francs towards the execution of a work on Assyrian antiquities.

— The Academy at St. Petersburg has been intrusted with all the books and manuscripts which were kept hitherto in the Asiatic Department of the Russian Ministry of the Foreign Office. This will be a great boon for scholars intent on Asiatic studies. These books are very rare, and most of them exist only in the countries where they have been published. They are written in Chinese, Mandshurian, Tibetan, Mongolian, and Sanskrit. The Gandshurian collection, written in the language of Tibet, comprises 170 volumes. The Tanshurian collection is still in the keeping of the Russian Ambassadorship at Peking.

— Richard the First seems to have been most fortunate in the chroniclers who have handed his exploits in the Holy Land down to posterity. In Abulfeda's Life of Saladin he is scarcely less prominently brought forward than Saladin himself, and never misrepresented willfully; whilst in Richard of Devizes, and in Richard, canon of the Holy Trinity, London, the chronicles of the latter of whom have just been edited, under the direction of the Master of the Rolls, by Mr. Stubbs, of Lambeth Palace, he was fortunate in having two impartial eye witnesses in his camp, from 1187 to 1192, who have narrated what they saw graphically, in scholar-like Latin, scarcely less pure than that of William of Malmesbury.

— A German printer, of the name of Vierling, of Görlitz, announces the Tercentenary commemoration next year of the founding of his office by Ambrosius Fritsch, in 1565, whose first book was an edition of Luther's Catechism of that date. In 1566, Fritsch issued a panoramic view of Görlitz, a large wood engraving, by George Scharfenberg, of which the blocks are still preserved in the office.

— At Paris, recently, an autograph of Tasso was sold, written by the poet of the *Gerusalemme Liberata*, in the twenty-sixth year of his age. It is worded as follows: "I, the undersigned, hereby acknowledge to have received from Abraham Levi, 25 lire, for which he holds in pledge a sword of my father's, 6 shirts, 4 sheets, and 2 table-covers. March 2, 1570. Torquato Tasso."

— We learn that the Italian government is about to dispatch a scientific expedition to the Pacific, and that it will in all probability sail during this month. It was intended that it should have started during the past spring, but it was prevented by the war-like rumors then so prevalent.

— Amherst College recently conferred upon Dr. Dio Lewis the honorary degree of Master of Arts, a compliment to the ability of the new master, and a graceful recognition of his services in behalf of physical education.

EDUCATIONAL INTELLIGENCE.

— In the following list we give the places and time of holding *Teachers' Institutes* in the State of New York for 1864, so far as we have learned that arrangements have been completed. The dates denote the times of the commencement of the Institutes, which generally continue ten days. The Institute for Wyoming County will be held in two places, five days in each. In Westchester County it will probably continue only six days.

County.	Place.	Time.
Erie.....	Springville.....	Sept. 5.
Steuben.....	Hornellsville.....	" 6.
Greene.....	Cairo.....	" 12.
Allegany.....	Angellen.....	" 19.
Washington.....	Fort Ann.....	" 19.
Wayne.....	Newark.....	" 19.
Tioga.....	Newark Valley.....	" 19.
".....	Waverly.....	Oct. 3.
Madison.....	Peterboro.....	Sept. 20.
Oneida.....	Rome.....	" 26.
Genesee.....	Batavia.....	" 26.
Monroe.....	Pittsford.....	" 26.
".....	Spencerport.....	Oct. 3.
Oswego.....	Mexico.....	" 3.

County.	Place.	Time.
Wyoming.....	Attica.....	Oct. 8.
".....	Pike.....	" 10.
Franklin.....	Malone.....	" 10.
Livingston.....	Geneseo.....	" 10.
Tompkins.....	Ithaca.....	" 10.
Essex.....	Elizabethtown.....	" 11.
Broome.....	Binghamton.....	" 17.
Chautauque.....	Westfield.....	" 17.
Delaware.....	Delhi.....	" 17.
Montgomery.....	Canajoharie.....	" 17.
Sullivan.....	Liberty.....	" 17.
Niagara.....	Lockport.....	" 24.
St. Lawrence.....	Madrid.....	" 31.
Westchester.....	Sing Sing.....	Nov. 14.
Clinton.....	Plattsburgh.....	" 21.

Toward defraying the expenses of these Institutes the State pays to each county holding one or more, with an attendance of *thirty* teachers during ten days, \$100, and in addition, at the rate of sixty cents for each teacher in excess of the thirty, who shall have attended ten days.

— At a recent meeting of the trustees of Dartmouth College, a number of important measures were inaugurated, of which the following is a summary:—

1. Mr. Elijah T. Quimby, principal of the Appleton Academy, at New Ipswich, New Hampshire, was elected Professor of Mathematics, to fill the vacancy caused by the resignation of Professor Varney. Mr. Quimby graduated in the class of 1851.

2. Mr. Edward R. Ruggles, of the class of 1859, was appointed instructor in modern languages and literature, in place of Professor Packard, transferred to the chair of Greek. Mr. Ruggles has for several years been pursuing his studies in Europe; of late in Dresden, Germany.

3. Commencement appointments are hereafter to be made, as formerly in Dartmouth, and as now in the other New England colleges, on the principle of relative merit.

4. There is to be a Junior Exhibition in the Spring term, and a joint anniversary of the two chief societies (the Social Friends and the United Fraternity) in the Fall term—the latter not to supersede the usual address before these societies at Commencement.

5. There is to be prize-speaking at Commencement. A fund of \$1,000 has been presented by Le Grand Lockwood, Esq., of New York, the interest of which is to be devoted to prizes in elocution and composition.

6. A reading-room is to be established; provision is to be made, by the employment of assistant librarians, for greater facility of access to the college library; and measures are proposed for giving greater prominence and interest to the annual meeting of the Alumni. The trustees have in view the erection, as soon as shall be practicable, of a gymnasium. They design, also, to prosecute vigorously the work, so successful thus far, of enlarging the endowment.

— At the last public examination of the pupils at the Training School, at Davenport, Iowa, which was a brilliant success, the merits of the Intuitive method, introduced into Iowa by H. S. Kissell, came under discussion. A committee was appointed by the Educational Convention to examine into the merits of the training school conducted under this system. From the report we make the following extract:—

We cannot resist the impression that a training school for teachers, organized as this is, and prosecuted with the vigor, energy, and precision which we here witness, is one of the great wants of the public school system in this country. Here we find a process by which teachers are literally prepared for their high and responsible vocation—a process which from the vigor of its methods, cannot fail to develop, to the utmost, every faculty for imparting instruction with facility, and for keeping a school in a condition of pleasant subjection.

It is evidently the great misfortune of our public schools in this country, that so many young men and women enter upon the profession of teaching without having served any apprenticeship for the business, and with no other qualifications than those of an exclusively literary character. They are, of consequence, without drill, without any acquired habits of teaching, or any settled method of governing a school; and are obliged to learn and unlearn, from the most mortifying experience, during which time the reputation of the teacher suffers, and not unfrequently the best of talent is ruined in the outstart.

This school is distinguished in these particulars:

1. Not simply the material of instruction and the best methods of communicating it, are supplied theoretically to the teacher, but he is required to put into practice that which he receives, and just as he receives it. To this end the pupils are required to inspect each other's work, to indulge freely in mutual criticisms, and to provide sketches of their work before entering upon it.

2. The intuitive method of instruction is adopted, the distinctive feature of which is, that the pupil is required steadily to advance by successive steps from the known to the unknown, from the concrete to the abstract—the teacher all the while appeal-

ing to the clear perceptions and first principles of knowledge in the mind of the pupil. To this is added a variety of methods, while the most accurate and appropriate forms of expression are elicited from the pupil, and a habit of cautiously framing his sentences is required. As a system adapted to all grades of primary education, we deem it unequaled.

The report was signed by O. Faville, the State Superintendent of Public Instruction; M. K. Cross, ex-President of the State Teacher's Association; three superintendents of schools, and others equally prominent.

NEW BOOKS.

ONE of those semi-spasmodic novels which the critics stigmatize as sensational, but which everybody likes to read, and will read nevertheless, is Mr. Jeaffreson's "Not Dead Yet." (1). Those who have read "Olive Blake's Good Work," will recognize the same peculiarities of authorship in the present volume, though the incidents and characters differ. So far as names go, Mr. Jeaffreson has travelled out of the beaten path, and into the world around. Few would have selected the name of Smith for a hero, and few would have taken it for the names of two of the prominent characters. The incidents are by no means extravagant—indeed, at points, they verge on the commonplace, yet they are woven together cleverly, told with an air of vraisemblance, and are worked into a story which rises into power, and never flags in interest. John Harrison Newbolt is rather an amiable ruffian, in the colloquial sense, and seems to be the highly colored picture of some individual in the author's range of acquaintance. The minuteness of detail, not always necessary to the story, shows the person to have been painted from life. Elihu Pike is not painted after that fashion. He is a wax-work figure. He bears no similitude to any Yankee past or present—probably to none of those who are to come. Mr. Jeaffreson has taken his notions of a travelling American from various sources, and has given us a component of the American Cousin, Jefferson Brick, and the stereotyped Yankee of Fraser's Magazine. The book, however, will please the majority of novel-readers, and teaches no false morality, nor does it pander to any sickly sentiment.

(1) *NOT DEAD YET.* A novel. By J. C. JEAFFRESON. New York: Harper & Brothers. Imp. 8vo, pp. 269.

In many of our common schools book-keeping is one of the recognized studies among the older pupils; and a very sensible, practical branch it is. The School System of Book-keeping, by Potter and Hammond, (2) will therefore supply a want in many of these schools, replacing the more cumbersome and less elementary works hitherto used. The book is in three parts. The first is devoted to Single Entry exclusively, contains a record of thirty-four transactions, and is illustrated by an engraved Cash-book, Day-book, and Ledger. The second contains sixty transactions, a balance sheet, and the first set in Double Entry. The third gives the second and third sets in Double Entry. There is also in this a test set of transactions for reviewing. The whole is lucid and simple, and perfectly adapted either to the wants of schools, or of individuals who may desire to acquire a thorough knowledge of book-keeping. The engraved script is exceedingly well done, and affords an admirable set of lessons of penmanship.

Of works on arithmetic there seems to be really no end; and the improvement over former books on this subject is marked in all the new issues. Eaton's Intellectual Arithmetic (3) appears to combine some of the best beauties of its rivals in a small space, in a new arrangement, and with some new

(2) *POTTER AND HAMMOND'S SYSTEM OF BOOK-KEEPING*, by Single and Double Entry. For Common and High Schools. In three numbers. Designed as a continuation of Potter and Hammond's Analytical and Progressive Penmanship. New York and Philadelphia: Schermerhorn, Bancroft & Co. Oblong 4to, pp. 32, 76, 169.

(3) *AN INTELLECTUAL ARITHMETIC*, upon the Inductive Method, with an Introduction to Written Arithmetic. By JAMES S. EATON, M. A. Boston: Taggard & Thompson. 18mo, pp. 176.

points of merit of its own. The "Suggestions to Teachers" at the beginning are valuable. There is one fault in teaching arithmetic, whether this or any other text-book be used, that should be speedily corrected—namely, a dependence upon the slate. By habit a pupil will be soon enabled to solve the most difficult problems mentally. Any one who has attended the exhibitions of any of the Institutes for the Blind, must have been struck with the readiness displayed by the pupils in working out the most difficult calculations without, of course, the aid of the black-board. Is there any reason why the possession of the faculty of sight should be a positive disadvantage to the young arithmetician?

Books for boys and girls that will interest their young readers, are to be desired. To be successful they must rather rise above than get below the level of the child. Children detest puerile books. They look upon childish expressions with contempt. They want a story told in plain language, and that story must have incident in abundance. "The Seven Champions," "Sinbad the Sailor," "Valentine and Orson," and "Robinson Crusoe"—the last the best of all, are models of their several kinds. Any child who can read decently finds interest in such stories. "Captain Horace," (4) is not one of this kind; but it is not without merit. It is told simply enough, and there are no absolutely silly expressions, wherein it is a great improvement upon many of children's books of recent date. The best part of the book is the little hero's adventures in the forest with Peter Grant.

The number of compilations of music for schools may be summed up by the word "legion." Some of these are positively good, a few positively bad, and a great many with a mixture of good and bad points. "The Silver Fountain," (5) which is one of the latest of these issues, may be put properly in the first list. The selections are generally judicious, the arrangement of the airs well adapted to the end in view, and the accompaniments simple and easy. We recommend it to the attention of Sabbath-schools and families.

To travel from music to geography, we notice two very curious maps issued by Lipincott & Co., of Philadelphia, which purport to be faithful reprints of maps published in 1492 and 1520. If they be true indications of the state of geographical science at the time of their issue, we have improved very much in our knowledge since then. They accompany the Comprehensive Geog-

raphy of the same publishers, and are a desirable addition to the stock of literary curiosities which every teacher should possess.

While on the subject of sheet publications, we must note the Zoological Chart, (6) by Simonson. It is exceedingly clear, and of great value to all teachers who make Natural History, in whole or in part, one of the subjects they teach. As an aid to the memory, they should be in the study of every man not as profoundly learned in zoology as Agassiz or Girard.

Among other noteworthy articles in the September number of that standard publication the *American Journal of Science and Arts*, are the papers on Celestial Dynamics, by J. R. Mayer; Molecular Physics, by Prof. Norton; Aerial Tides, by P. E. Chase; and Notes on the Platinum Metals, by M. Carey Lea. The general summary of scientific intelligence presented in each number, renders this journal invaluable to all who would keep up with the steady and unceasing advance of science.

As the business man keeps a record of his daily transactions, so should the teacher keep a precise record of the pupils' standing from day to day. Mr. Potter's School Record (7) appears opportunely, as the winter schools are about to be organized. This little book is complete, and well adapted to its purposes.

The main difficulty about most of the treatises on algebra is in their lack of proper progression. They all presuppose a mental capacity not always found in the pupil, or a mathematical aptness not always found in young persons of very good mind in other respects. Bailey's First Lessons (8) is a book on a better plan. It commences at the very beginning, and then marches on step by step in a natural and easy progression. While it simplifies the acquisition of the elements, it omits nothing in the end. The pupil acquires as much, but with more ease and equal certainty.

The September number of Barnard's *American Journal of Education* contains a series of well-digested articles, among which we particularly notice—"Public Instruction in Hesse Darmstadt," "The Jesuits and their Schools," and "Military System and Schools in Russia." The *Journal* is, and deserves to be, the leading publication of its kind in the United States. It is conducted with vigor, tact, and ability.

(6) SIMONSON'S ZOOLOGICAL CHART, a Directory to the Study of the Animal Kingdom. New York and Philadelphia: Schermerhorn, Bancroft & Co.

(7) POTTER AND HAMMOND'S SCHOOL RECORD AND RECITATIONS. By S. A. POTTER. New York and Philadelphia: Schermerhorn, Bancroft & Co. Oblong 16mo, pp. 32 \$1.50 per dozen.

(8) FIRST LESSONS IN ALGEBRA; being an Easy Introduction to that Science. Designed for the use of Academic and Common Schools. By KENNEDY BAILEY. New York and Philadelphia: Schermerhorn, Bancroft & Co. 16mo, pp. 224.

(4) CAPTAIN HORACE. By SOPHIE MAY. Boston: Lee & Shepard. 24mo, pp. 183.

(5) THE SILVER FOUNTAIN OF SABBATH SCHOOL MELODIES, comprising a great variety of new Music and Hymns. By A. J. ARNET. New York: Abbey & Barrett. Oblong 16mo, pp. 128.